

References Values and Validation of the Spanish Version of the SF-12, in Barranquilla, Colombia 2012

Rafael Tuesca Molina* and Fabian Munoz

Department of Public Health, Universidad del Norte, Barranquilla-Colombia

Abstract

Objective: To estimate the reference values of the questionnaire SF-12 version 2, its validation and subsequent analysis by principal components and to estimate the correlation to the dimensions of quality of life related to health for the adult non-institutionalized population in Barranquilla, Colombia.

Study design: Cross-sectional study.

Methods Surveys were applied to 1,480 non institutionalized adults aged 20 years and older. The references of central tendency, dispersion and analysis of internal consistency were calculated using Cronbach's alpha and correlation interclass using principal component analysis.

Results: The highest average scores were presented in the domains of pain, 91.8 (\pm 19.6). Social functioning was second with 90.6 (\pm 22.2). The lowest scores were mental health with 49.6 (\pm 12.0) and general health with 59.4 (\pm 23.5). Males reflected higher scores than women in the dimensions of social function, physical functioning, and physical role. However, mental health in women showed greater punctuation. Cronbach's Alpha was 0.73, while for the physical role and emotional role it was 0.85. Mental health was the lowest at 0.59. The inter-scale correlation coefficients resulted in ranges from intermediate to low ($r=0.74$ to -0.14 ; $p=0.00$). In the analysis of components, the first component corresponds to the dimensions of pain related to general health, physical functioning, physical role, emotional role and vitality. The second component corresponds to mental health and social functioning.

Conclusion: Useful results to adjust health programs focused on gender and assess the extent of health intervention results. The values can be used as normative references for the Caribbean region of Barranquilla, Colombia.

Keywords: Health-related quality of life; SF-12; Validity; Population-based norms

Introduction

Quality of life related to health is an important metric for evaluating therapeutic interventions or programs. Quality of life is a multidimensional and dynamic concept widely used in surveys where interacting determinants of biological, psychological, socio economic, cultural and smart policies are involved. This measurement allows assessment of subjective and interpersonal physical health, mental health, and social functionality which are expressed in the eight dimensions of quality of life related to health [1-6].

The metric of quality of life is of interest to evaluators of health policies and interventions, due to the sensitivity features in the applications of the Short Family Health Survey (SF): 36,12 and 8, [3,7-11]. This highly reliable measurement goes beyond the usual indicators of morbidity, mortality and life expectancy [5].

As of today, the long and short version of the health related quality of life instruments (SF36 and SF12) have been applied to healthy people and patients with diseases such as diabetes, musculoskeletal disorders, depression and healthy individuals [1-6,8-10,12-17] in only two cities in Colombia (Bogota and Medellin). However, in Barranquilla, there are no population reference values of the short version of SF12 V2. It is estimated that the context of region, culture and living and working conditions influence the perception of quality of life [1,5].

Method

Design and study subjects

This is a descriptive cross sectional study. General non-

institutionalized population 20 years of age or older from Barranquilla, Colombia, were interviewed in their homes in 2012. According to the 2012 Census, Barranquilla had total 694,043 inhabitants spread in five geographic locations: Riomar, Southeast, Southwest, Metropolitan, and Norte Centro Historico.

This study is part of a project called Global Health Intervention where the prevalence of metabolic syndrome was estimated as an object of community intervention, considering a prevalence of 14.8, an error of 2.0%, and a confidence level of 95%.

For the purpose of this study, this population was adjusted to 15% due to non-response or non-participation obtaining a sample of 1,480 subjects. To achieve greater precision in the estimates, we conducted stratified random sampling by location, age and gender. Failure to find the chosen subject (after three different attempts) was remedied by proceeding to interview the neighbor home.

Study Instruments and variables

The general questionnaire consisted of 151 open ended questions

*Corresponding author: Rafael Tuesca Molina, Assistant Professor, Department of Public Health, Universidad del Norte, Barranquilla-Colombia, Tel: 5753509287; E-mail: rtuesca@uinorte.edu.co

Received October 19, 2015; Accepted December 11, 2015; Published December 18, 2015

Citation: Molina RT, Munoz F (2015) References Values and Validation of the Spanish Version of the SF-12, in Barranquilla, Colombia 2012. J Psychol Psychother 5: 231. doi:10.4172/2161-0487.1000231

Copyright: © 2015 Molina RT, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

grouped in six fields: family history of chronic illness, health problems, use of health services, health status, lifestyle, and demographic data. For all these areas, with the exception of quality of life, the National Health Survey of Colombia (ENS 2007) was taken as a reference. However, this study only described socio-demographic variables (age group, gender, level of education, socio-economic stratum and marital status). Age was categorized into three groups: 20 to 35 years old, 35 to 65 years old and older than 65. The socioeconomic variable was grouped into six levels; the lower level (1) corresponds to subjects with lower levels of wealth and the highest level (6) subjects with greater purchasing power (Secretary of Planning of Barranquilla). The educational level has four categories: did not attend school, elementary school, high school, and technical or college degree. The categories of the marital status variable are: single, married, separated/divorced, and widowed.

SF-12v2: Description and construction of dimensions

The health status evaluation was made by using the Health Questionnaire SF-12v2. The implementation of the survey was conducted by previously trained interviewers. The twelve (12) questions of SF 12 V2 were used to construct eight dimensions or HRQL subscales: general health, physical functioning, physical role, emotional role, vitality, mental health, social functioning and pain. Physical function, physical role and bodily pain reflect the physical component of health. Social functioning, emotional role and mental health make up the psychosocial aspects which together with vitality and general health give an overview of subjective health. Were estimated standardized physical components as well as mental components

The score for each dimension goes from 0 to 100. Subjects with a score of 100 express a better condition, while subjects with scores below 50 are considered subjects with a low quality of life in the dimension valued. In the case of pain, those with scores near one hundred express the absence of pain.

Since validation of this instrument for the entire population of Colombia doesn't exist, we used the Spaniards weights to estimate the final components of physical and mental type.

Ethical aspects

This research ensures compliance with the guidelines for the protection of research subjects. Participants received a letter informing them about the project and their rights as participants. The research was approved by the Ethics Committee of the Universidad del Norte and complies with the national guidelines (Resolution No. 8430 of the Ministry of Health of Colombia) and international guidelines (the Declaration of Helsinki) related to the participants' informed consent.

Analysis

The results were analyzed in the Statistical Package for Social Studies (SPSS) version 21 and Statgraphics Centurion XVI. We calculated measures of central tendency, dispersion and percentiles for each punctuation summary of the SF-12, v2. Fit testing was not applied by age group since previous studies [7,18-20] have shown that categories of the SF 12 are similar to those used in other countries and the results are stable or decrease slightly by age [2,6,12,13]. We tested internal consistency using the Cronbach's Alpha coefficient. We considered acceptable for this study a coefficient alpha of 0.7 or greater for both subgroups as for the general population, as recommended in previous studies and the psychometric theory [21,22]. To test the ability of the discrimination of the instrument, means were calculated. Their respective standard deviation (SD) and intraclass correlation were

estimated through the Pearson correlation coefficient. We utilized the method of analysis of components for each quality of life dimension. This technique reduces the number of variables involved in each factor and rediscovers the grouping of variables. As a result, the variables of each group were highly correlated allowing us to explain the largest part of the variability of each of the factors (Figure 1).

Results

Characteristics of the population

The characteristics of the study sample (Table 1) indicate that 53% were women. Forty two percent finished high school and only 1% did not attend school. Sixty four percent are from socioeconomic stratus

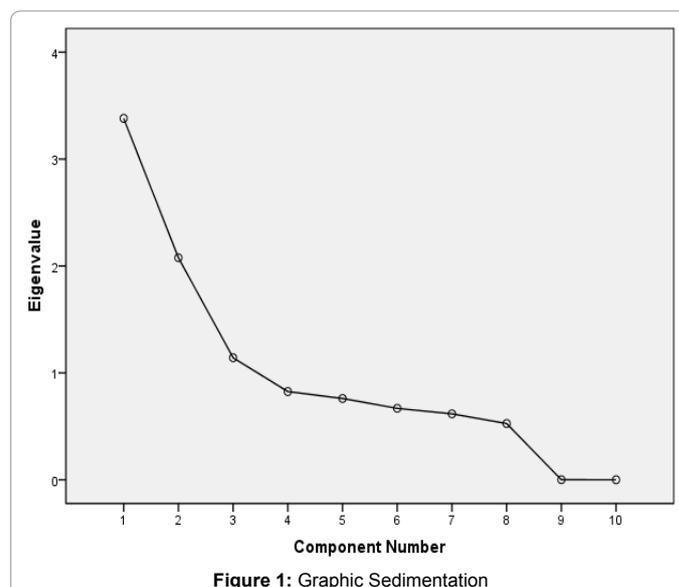


Figure 1: Graphic Sedimentation

Socio-demographic Variables	Frequency (%)
Sex:	
Male	697 (47,09)
Female	783 (52,90)
Age Group:	
20-29	386 (26,08)
30-39	331 (22,36)
40-49	285 (19,25)
50-59	193 (13,04)
60-69	130 (8,80)
>70	155 (10,47)
Academic Level:	
No Schooling	12 (0,81)
Low Educational Level	222 (15,00)
Medium Educational Level	612 (41,35)
High Educational Level	634 (42,84)
Socio-Economic Stratus:	
Stratus 1	123 (8,31)
Stratus 2	178 (12,03)
Stratus 3	949 (64,12)
Stratus 4	229 (15,47)
Marital Status:	
Married	494 (33,46)
Single	470 (31,84)
Common law marriage	322 (21,82)
Separated/Divorced	91 (6,16)
Widow/Widower	99 (6,70)

Table 1: Characteristics to socio-demographic variables of the population studied.

3. Forty eight percent of the sample is between the ages 20 to 39 years, and more than half of the total sample (55%) is either married or lives with a partner.

A total of 1,480 subjects were studied; 52.8% were females with a mean age of 44.15 years old ($\pm 17,69$) and in males the mean age was 42.81 years old. ($\pm 17,6$). Forty-two point eight percent of the subjects had advanced studies (technological and university studies), and 10.16% had a low educational background (either no studies or incomplete primary school studies). With respect to socioeconomic levels, 64.12% came from the low middle class (level 3) and 20.33% came from the low class (level 1 and 2).

Ninety-eight percent of the people responded to all of the SF=12 v2 questions. The highest average scores came from the following components: pain, social function, emotional role, physical role and vitality while the lowest average scores came from the components of general health and mental health (Table 2A). The males presented better scores than the females on the majority of the components except for mental health. In regard to the male's physical function, pain and the standardized physical and mental components, as the ages went up, the scores went down. Socio economic status did not have a significant effect on the results. Single men presented better scores on physical function and pain (they registered less pain) while the separated men had low scores on mental health and high scores on physical role and social function. Men with higher educational levels had better scores on the components of general health, physical function, physical role, vitality and standard components.

In regard to the women, the higher the age, the lower the score on physical functioning, physical role, emotional role, vitality, social functioning, and pain (they had pain). Single women had better general health, physical functioning, and emotional role. The widows had high scores in pain, social functioning, mental health, and physical role. In regard to educational level, those women that had advanced schooling had better scores on general health, physical functioning, emotional role, vitality, social functioning, and pain (Table 2B).

The accuracy level as estimated with the Cronbach alpha statistic for the parameters of the SF-12 by groups and globally for all 12 items showed an acceptable internal consistency. This result exceeded the proposed standard of (0.70) in all of the criteria of the SF-12 given the Cronbach SCM alpha coefficient of (0.73). Upon analyzing the proposed dimensions: physical function, physical role, emotional role; there was a high consistency with the Cronbach Alpha of 0.81 to 0.85, respectively. At the same time, there were some age variations found. This was especially true for the 65+ age group, particularly for the components of physical role and emotional role. Women with ages between 20-35 years old showed the lowest mental health score (0.53) (Table 3).

Table 4 shows the inter-scale correlation which were in the intermediate range. The highest correlations were in physical function, physical role, mental health, emotional role, and pain ($r=0,74$ $a=-0.04$ $p<0.01$). The four representative SCM-12 health scales showed low correlations ($r=0,17$ a $0,35$ $p<0,01$), with emotional role presenting the lowest correlation.

	General health	Physical function	Physical role	Rol Emocional	Vitality	Mental health	Social function	Pain	PCS	MCS
Socio-demographic Variables										
Global (men and women) n=1480	59,40 ($\pm 23,5$)	88,5 ($\pm 23,4$)	86,4 ($\pm 32,2$)	89,0 ($\pm 29,2$)	79,6 ($\pm 24,9$)	49,6 ($\pm 12,0$)	90,6 ($\pm 22,2$)	90,8 ($\pm 19,6$)	49,9 ($\pm 9,7$)	50,0 ($\pm 8,2$)
Age Group (n=697)	62,7 ($\pm 23,6$)	91,7 ($\pm 20,2$)	90,2 ($\pm 20,2$)	91,8 ($\pm 26,1$)	83,0 ($\pm 23,3$)	48,8 ($\pm 11,9$)	93,4 ($\pm 18,9$)	93,9 ($\pm 16,6$)	51,8 ($\pm 8,6$)	50,0 ($\pm 7,8$)
20-35 years old (n=298)	67,3 ($\pm 23,7$)	96,1 ($\pm 13,2$)	90,1 ($\pm 26,7$)	93,4 ($\pm 23,9$)	83,7 ($\pm 23,8$)	48,5 ($\pm 11,7$)	93,6 ($\pm 19,3$)	94,5 ($\pm 15,7$)	53,2 ($\pm 7,4$)	49,6 ($\pm 7,8$)
35-65 years old (n=298)	59,1 ($\pm 23,4$)	92,4 ($\pm 18,8$)	92,6 ($\pm 23,6$)	90,6 ($\pm 28,1$)	84,9 ($\pm 20,9$)	48,8 ($\pm 12,3$)	94,4 ($\pm 17,4$)	94,5 ($\pm 15,3$)	51,9 ($\pm 8,1$)	50,0 ($\pm 8,1$)
65 years older or more (n=93)	59,7 ($\pm 21,5$)	75,2 ($\pm 31,8$)	82,7 ($\pm 35,7$)	90,8 ($\pm 26,5$)	74,8 ($\pm 27,3$)	49,6 ($\pm 10,8$)	89,7 ($\pm 21,8$)	90,2 ($\pm 22,5$)	47,2 ($\pm 11,3$)	51,4 ($\pm 6,5$)
Socio-Economic Stratus										
Stratus 1 (n=51)	55,6 ($\pm 21,5$)	95,5 ($\pm 13,8$)	92,1 ($\pm 27,1$)	90,1 ($\pm 30,0$)	82,3 ($\pm 26,1$)	50,5 ($\pm 12,8$)	89,2 ($\pm 25,1$)	91,5 ($\pm 19,9$)	50,9 ($\pm 8,8$)	50,0 ($\pm 8,5$)
Stratus 2 (n=100)	62,7 ($\pm 20,9$)	90,5 ($\pm 22,9$)	86,0 ($\pm 32,6$)	91,0 ($\pm 26,9$)	83,8 ($\pm 25,0$)	49,1 ($\pm 9,8$)	92,7 ($\pm 20,1$)	90,5 ($\pm 23,5$)	50,7 ($\pm 11,1$)	50,7 ($\pm 7,7$)
Stratus 3 (n=447)	63,6 ($\pm 24,1$)	92,3 ($\pm 19,3$)	91,1 ($\pm 25,6$)	92,0 ($\pm 25,9$)	83,9 ($\pm 22,3$)	48,1 ($\pm 12,3$)	94,1 ($\pm 18,3$)	94,0 ($\pm 13,4$)	52,4 ($\pm 7,9$)	49,8 ($\pm 7,7$)
Stratus 4 (n=99)	62,1 ($\pm 24,6$)	88,1 ($\pm 23,2$)	89,3 ($\pm 26,9$)	92,9 ($\pm 24,7$)	78,5 ($\pm 24,2$)	50,4 ($\pm 11,4$)	93,4 ($\pm 16,5$)	94,1 ($\pm 19,9$)	50,5 ($\pm 8,6$)	50,9 ($\pm 7,9$)
Marital Status										
Single (n=251)	66,4 ($\pm 23,6$)	96,6 ($\pm 12,1$)	90,6 ($\pm 26,1$)	91,2 ($\pm 27,2$)	82,8 ($\pm 23,3$)	49,7 ($\pm 12,0$)	93,2 ($\pm 19,5$)	95,6 ($\pm 15,7$)	51,6 ($\pm 7,4$)	49,7 ($\pm 7,7$)
Married (n=401)	60,5 ($\pm 23,6$)	89,5 ($\pm 22,0$)	89,2 ($\pm 28,4$)	91,8 ($\pm 26,0$)	83,3 ($\pm 23,4$)	48,3 ($\pm 11,8$)	93,5 ($\pm 18,8$)	93,3 ($\pm 16,8$)	51,1 ($\pm 9,1$)	50,2 ($\pm 7,8$)
Separated/Divorced (n=26)	59,8 ($\pm 21,8$)	85,5 ($\pm 30,1$)	98,0 ($\pm 9,8$)	96,1 ($\pm 19,6$)	87,6 ($\pm 20,4$)	43,4 ($\pm 12,6$)	97,1 ($\pm 10,7$)	90,3 ($\pm 23,5$)	51,6 ($\pm 7,4$)	49,7 ($\pm 7,7$)
Widow/Widower (n=17)	60,0 ($\pm 21,6$)	77,9 ($\pm 32,9$)	94,1 ($\pm 24,2$)	94,1 ($\pm 24,2$)	71,7 ($\pm 24,5$)	53,5 ($\pm 8,6$)	88,2 ($\pm 23,5$)	95,3 ($\pm 13,5$)	47,4 ($\pm 9,6$)	52,4 ($\pm 5,4$)
Academic Level										
No Schooling (n=4)	42,5 ($\pm 20,2$)	75,0 ($\pm 28,8$)	50,0 ($\pm 57,7$)	75,0 ($\pm 50,0$)	50,0 ($\pm 38,2$)	47,5 ($\pm 9,5$)	93,7 ($\pm 12,5$)	75,0 ($\pm 50,0$)	40,3 ($\pm 19,0$)	48,8 ($\pm 17,1$)
Low Educational Level (n=82)	64,1 ($\pm 21,1$)	86,2 ($\pm 25,8$)	90,2 ($\pm 25,3$)	93,2 ($\pm 23,2$)	80,7 ($\pm 25,4$)	50,1 ($\pm 10,4$)	93,5 ($\pm 16,5$)	91,8 ($\pm 20,1$)	50,0 ($\pm 9,3$)	51,4 ($\pm 6,9$)
Medium Educational Level (n=298)	60,5 ($\pm 23,6$)	90,3 ($\pm 21,9$)	89,4 ($\pm 28,9$)	90,6 ($\pm 28,6$)	82,4 ($\pm 28,8$)	49,7 ($\pm 11,4$)	94,3 ($\pm 17,6$)	94,6 ($\pm 14,6$)	51,1 ($\pm 9,2$)	50,3 ($\pm 7,9$)
High Educational Level (n=313)	64,6 ($\pm 24,1$)	94,6 ($\pm 15,8$)	91,5 ($\pm 24,6$)	92,9 ($\pm 24,6$)	84,7 ($\pm 21,3$)	47,6 ($\pm 12,6$)	92,5 ($\pm 20,9$)	94,0 ($\pm 16,6$)	53,0 ($\pm 7,3$)	49,5 ($\pm 7,7$)

Table 2A: Measurements and standard deviation of the dimensions of quality of life according to socio-demographic variables of the male population studied.

	General health	Physical function	Physical role	Rol Emocional	Vitality	Mental health	Social function	Pain	PCS	MCS
Socio-demographic Variables										
Age Group (n=783)	56,4 (± 23,0)	85,5 (± 25,6)	83,0 (± 35,8)	86,3 (± 31,4)	76,4 (± 25,8)	50,3 (± 12,0)	88,0 (± 24,4)	89,5 (± 22,3)	48,4 (± 10,2)	50,0 (± 8,5)
20-35 years old (n=292)	58,5 (± 22,3)	92,3 (± 18,0)	88,8 (± 29,9)	90,1 (± 27,7)	78,0 (± 24,5)	49,7 (± 11,7)	90,3 (± 22,7)	93,9 (± 17,2)	51,0 (± 7,6)	49,5 (± 8,4)
35-65 years old (n=387)	56,1 (± 22,7)	86,9 (± 22,9)	82,0 (± 36,5)	85,2 (± 32,0)	77,9 (± 25,4)	50,2 (± 11,9)	88,9 (± 23,0)	89,1 (± 22,4)	48,9 (± 10,1)	49,7 (± 8,5)
65 years old and older (n=101)	51,6 (± 25,4)	61,2 (± 36,8)	70,1 (± 44,3)	79,8 (± 37,2)	66,5 (± 28,8)	52,6 (± 12,8)	78,1 (± 30,7)	78,6 (± 29,9)	40,6 (± 12,5)	51,8 (± 8,4)
Socio-Economic Stratus (n=782)										
Stratus 1 (n=72)	57,7 (± 22,3)	93,0 (± 14,6)	93,0 (± 24,1)	90,9 (± 26,9)	80,0 (± 24,6)	49,0 (± 9,80)	86,8 (± 27,8)	94,0 (± 14,2)	51,7 (± 7,6)	48,8 (± 8,2)
Stratus 2 (n=78)	55,8 (± 20,9)	85,5 (± 25,9)	78,2 (± 43,8)	79,4 (± 38,1)	72,5 (± 26,9)	50,5 (± 12,0)	86,2 (± 26,9)	89,4 (± 22,6)	48,4 (± 11,9)	48,5 (± 10,1)
Stratus 3 (n=502)	55,5 (± 22,8)	85,2 (± 26,2)	82,2 (± 35,9)	87,5 (± 30,4)	76,5 (± 25,9)	49,9 (± 11,9)	88,7 (± 23,4)	89,4 (± 22,7)	48,1 (± 10,3)	50,2 (± 8,2)
Stratus 4 (n=130)	59,2 (± 24,8)	85,2 (± 27,0)	83,0 (± 34,9)	83,8 (± 32,4)	76,6 (± 25,6)	52,6 (± 13,4)	86,9 (± 24,7)	87,5 (± 24,1)	47,9 (± 10,5)	50,6 (± 8,6)
Marital Status										
Single (n=220)	58,2 (± 23,5)	89,4 (± 21,3)	85,9 (± 31,7)	87,7 (± 29,9)	76,2 (± 25,5)	49,7 (± 13,4)	89,4 (± 23,5)	91,7 (± 19,6)	50,0 (± 8,8)	49,4 (± 8,9)
Married (n=415)	55,5 (± 22,4)	86,6 (± 24,9)	83,1 (± 36,5)	87,3 (± 30,3)	76,2 (± 26,2)	49,9 (± 11,7)	87,3 (± 24,9)	89,5 (± 22,6)	48,5 (± 10,5)	49,8 (± 8,4)
Separated/Divorced (n=65)	56,4 (± 22,3)	85,5 (± 20,2)	82,9 (± 27,2)	86,3 (± 32,9)	76,4 (± 23,2)	50,3 (± 11,4)	88,0 (± 20,6)	89,5 (± 18,6)	50,2 (± 7,8)	50,7 (± 7,9)
Widow/Widower (n=82)	57,6 (± 24,8)	89,2 (± 35,0)	89,2 (± 44,9)	84,6 (± 38,4)	80,9 (± 26,9)	52,6 (± 9,8)	92,3 (± 26,5)	92,6 (± 28,1)	42,4 (± 12,4)	51,9 (± 8,1)
Educational Level										
No Studies (8)	46,8 (± 18,1)	68,7 (± 34,7)	87,5 (± 35,3)	81,2 (± 37,2)	65,0 (± 27,7)	41,2 (± 14,5)	84,3 (± 22,9)	81,2 (± 29,1)	45,9 (± 9,5)	44,8 (± 8,0)
Low Educational Level (140)	55,8 (± 23,2)	76,7 (± 31,8)	78,2 (± 39,8)	86,0 (± 32,3)	74,1 (± 27,0)	52,0 (± 11,1)	86,4 (± 26,3)	86,5 (± 24,5)	45,4 (± 12,2)	51,6 (± 8,0)
Medium Educational Level (314)	54,4 (± 23,4)	87,3 (± 22,9)	83,1 (± 35,9)	85,3 (± 32,3)	76,2 (± 26,1)	49,7 (± 11,2)	87,4 (± 24,7)	88,9 (± 23,1)	48,7 (± 9,9)	49,3 (± 8,2)
High Educational Level (321)	59,0 (± 22,3)	88,0 (± 23,9)	85,0 (± 33,7)	87,8 (± 30,0)	78,0 (± 24,9)	50,5 (± 12,9)	89,5 (± 23,1)	91,6 (± 20,2)	49,6 (± 9,4)	50,1 (± 8,8)

Table 2B: Averages and standard deviations for the dimensions of quality of life according to socio-demographic variables of the female population studied.

Characteristics	Physical Function	Physical Role	Emotional Role	Mental Health
	Cronbach Alpha	Cronbach Alpha	Cronbach Alpha	Cronbach Alpha
Total	0.81	0.85	0.85	0.59
Men	0.85	0.85	0.89	0.65
Women	0.77	0.85	0.81	0.53
20-35 years old	0.82	0.76	0.77	0.55
35-65 years old	0.83	0.87	0.87	0.60
>65 years old	0.76	0.91	0.90	0.66

Table 3: Reliability Coefficient for the Cronbach Alpha for the domains of physical function, physical role, emotional role, and mental health from the SF 12v2 Questionnaire by groups.

	Domains									SPC	SMC
	General health	Physical function	Physical role	Rol Emocional	Vitality	Mental health	Social function	Pain			
General health	1										
Physical function	0,23*	1									
Physical role	0,20*	0,43*	1								
Rol Emocional	0,12*	0,24*	0,38*	1							
Vitality	0,21*	0,27*	0,24*	0,21*	1						
Mental health	0,03§	-0,04§	-0,07*	-0,11*	0,10*	1					
Social function	0,15*	0,26*	0,31*	0,36*	0,19*	-0,11	1				
Pain	0,16*	0,35*	0,39*	0,28*	0,15*	-0,09	0,31*	1			
SPC	0,51*	0,74*	0,69*	0,17*	0,28*	-0,29*	0,35*	0,66*	1		
SMC	-0,01	-0,14*	-0,04*	0,53*	0,37*	0,62*	0,31*	-0,10*	-0,38*	1	

Table 4: Inter-scale Domain Correlation Health Questionnaire SF12 from the study population.

For the analysis of the main components, we used the “Kolmogorov-Smirnov normality test”. This test quality of life dimensions general health, physical function, emotional role, vitality, mental health, social function, and pain. According to the result of this test (lower than 5%), these dimensions are not normally distributed. Although we conducted the pertinent transformations, it was not possible to produce a normal output, perhaps due to lack of symmetry that was presented.

After this analysis, we conducted a sphericity test using the Bartlett contrast. The result of this test showed that the variables analyzed were not correlated. Therefore, we applied a factorial analysis [22] (Table 5). It is also important to mention that only two dimensions explain 54.6% variability.

The eigenvalues are related with the explained variance and for

Component Matrix	Component	
	PC1 Total variance explained 33,8%	PC2 Total variance explained 20,8%
General health	0,47	0,00
Physical function	0,73	-0,10
Physical role	0,75	0,01
Rol Emocional	0,48	0,53
Vitality	0,42	0,43
Mental health	-0,21	0,62
Social function	0,54	0,32
Pain	0,68	-0,09
SPC	0,93	-0,33
SMC	-0,05	1,00

PC1 and PC2=proxies in each major component

Table 5: Principal component (PC) analysis and total variance explained.

determining the number of principal components. If standardized values, the number of main components is given by those eigenvalues greater than one. In this case, for dimension 1, there are 6 major components (the standardized physical component represents the physical role, physical functioning, pain, general health and emotional role) that summarize all the information, the total variance explained by 33.8% of the first components for the dimension. For dimension 2, there are 4 main components (mental health, vitality, social functioning and the standardized mental component) representing 20,8% of total explained variance which fully describes 54.6% of the total variability. This percentage is low, because the variables showed a median correlation in the correlation matrix.

Discussion

Regarding the normative values for the population of Barranquilla, subjects younger than 20 years old were excluded in order to avoid ethical problems with informed consent. This is the first study to estimate normative values of quality of life in the Caribbean region of Barranquilla and the third in the country [15].

This work provides the first step in the process of validation of the psychometric properties, reference values for each of the dimensions of quality of life in our region, and the inclusion of principal component analysis added value to this type of study. This evidence could be of great used in epidemiological studies aiming to evaluate health interventions.

According to the results of each dimension, to estimate the variable component during the process of construction of the physical and mental summaries, the Spanish index weights were used since the findings were similar to the Spanish weights and far from the estimates of the national study developed by Ramirez et al. [1]. The summary indices obtained were similar to other studies especially with the score of the physical component [4,10,16,23,24] and the mental component [11,18]. Similarly, higher scores were observed in males than in females, making women consistently undervalue their quality of life and health compared to men [2,3,6,9,15-16,18,19]. With regard to level of study in the physical component, our findings were similar to the studies available [9,14,15] detecting that as the educational level increases, the scores for this component increase for both sexes [2,6,9,12,18,19] as well as for the mental component in women [2,9]. However, the socioeconomic context differed due to the estimation of the same, since in some research it was valued by income level, job field, or the combination of social class and occupation [2,7,10,12,19,24]. Nevertheless, our findings showed no differences in the socioeconomic stratification and should not be compared with the results of these studies.

Findings related to low mental health score among women could be explained by several factors. First, the fact of being a woman, young, single and uneducated could increase women risk of experiencing stressful events such as violence, geographic displacement and sexual abuse [25-27]. Second, studies have shown that cultural characteristics of a region could influence perception of quality life [28]. Finally, the spatial context could also impact the way people perceive and report quality of life [27]. Colombia has a very diverse culture and geographic characteristics. Compared to population from different geographic regions in Colombia, people from Barranquilla have a multicultural mix of Latin American and Caribbean cultures [28].

The scores of the dimensions of physical function, physical role, emotional role, vitality, social function and pain reflected higher values than reported by Larson in the Southeast of the United States [10], while scores in general health and mental health were lower in our study compared to the findings reported in Medellin, Colombia [1]. However, scores on Chinese subjects reported by Lam E [10] reflected better scores in most components, except vitality. Regarding the Murcia-España study [2], differences could be seen in most dimensions, with the exception of mental health which has a higher score that in our population. However, assuming the Colombian study that took place in Medellin where the SF-36 was used, scores of the eight dimensions and the two indices reflected scores similar to ours.

In regard to interclass correlations, our study presented intermediate ranges, whereas the results of Ramirez et al. [1]; Jakobsson et al. [29], Larson [10] and Lam C [24] estimated stronger correlations. For the 12 items, our findings were similar to the results found by Amir, et al. [18] and Brazier, et al. [7]; however, to estimate the correlation for each dimension, the two summarial components were included. In regard to the preliminary analysis in the eight-dimensional correlations are below 0,7 showing significance despite the medium or low correlation. This differs from the Amir study, and by adding the two summarial components, the correlation reaches 0,74. A correlation is observed for physical function with the summarial component ($p < 0,01$), and a negative correlation was observed between the summarial physical component and the mental one ($p < 0,01$). This is similar to the findings of Lou X [8], Luciano J et al. [30], Failde I et al. [15] and Lam E et al. [4] in patients with pain; therefore, we can assume that this population has some effect in the mental component considering the estimated average of mental health. From the above, we can deduct an influence in the magnitude of explained variable when the summarial components are included in the analysis of correlations.

It should be noted, that the two estimated components express the structural elements in the summarial components. The physical component or physical function is made by the general health determinants, physical role, emotional role, pain, and the standardized physical component. The mental component is made by social functioning, vitality and mental health. These findings allow for adjustments to the component of weight for this region; however with the built estimate the magnitude of the summarial components can be predicted for a new study in this region.

We would recommend incorporating in the validation of this questionnaire, other dimensions to measure pain, vitality and general health since we have only one. This prevents it from estimating the Cronbach coefficient for its validation. However, each number of responses should be standardized.

It should be highlighted that in this study the vast majority of participants answered all questions in the questionnaire. This allows

getting more practical scores and avoiding the use of extrapolation for results or inputting data. That eventually allows us to show validity of construction and interpretation of the items of the questionnaire. Differences in some dimensions in our study should be evaluated as a function of present morbidity in participants, such as: presence and knowledge of hypertension, diabetes and metabolic syndrome. These results are useful to evaluate health interventions and to allow for the comparison of possible differences between this study's findings and the results of studies conducted in Cali using the SF12 [1], in Bogotá [31] and Medellín [5] using the SF36.

Conclusion

Findings of this cross-sectional study allow us to suggest that the SF12 could be a useful instrument to measure patients' quality of life in the primary care setting in Barranquilla. This instrument could also be of great use to evaluate community health interventions aiming to promote health in this city.

It is valid to point out the need of developing public health interventions that focus on empowering and strengthen women positive attitudes. In addition, it is important to focus on enhancing current public health policies that aim to reduce violence against women in order to impact the social and mental situation of this population's group.

This study presents two important limitations. First, it only estimates the metric of quality life for people over 20 years old. Second, the fact that this study used a representative and probabilistic sample of Barranquilla allows us to validate the SF12 v2 only for the population of this City. It is important to highlight that this is the first study conducted to validate the SF12 instrument among the population of Barranquilla, Colombia.

Acknowledgement

This study received financial support from the Universidad del Norte under development of strategic projects called: Global Health, within three strategic areas in order to enhance institutional research.

Reference

- Ramírez-Vélez R, Agredo-Zuñiga RA, Jerez-Valderrama AM (2010) Confiabilidad y valores normativos preliminares del cuestionario de salud SF-12 (Short form 12 health survey) en adultos colombianos. *Rev Salud Pública* 12: 807-819.
- Monteagudo-Piqueras O, Hernando-Arizaleta L, Palomar-Rodríguez JA (2009) Valores de referencia de la población diabética para la versión española del SF-12v2. *Gaceta Sanitaria* 23: 526-532.
- Jenkinson C, Chandola T, Coulter A, Bruster S (2001) An assessment of the construct validity of the SF-12 summary scores across ethnic groups. *J Public Health Med* 23: 187-194.
- Lam ET, Lam CL, Fong DY, Huang WW (2013) Is the SF-12 version 2 Health Survey a valid and equivalent substitute for the SF-36 version 2 Health Survey for the Chinese? *J Eval Clin Pract* 19: 200-208.
- García HI, Vera CY, Lugo LH (2013) Calidad de vida relacionada con la salud en Medellín y su área metropolitana, con aplicación del SF-36. *Rev Fac Nac Salud Pública* 32: 26-39.
- Fleishman JA, Lawrence WF (2003) Demographic variation in SF-12 scores: true differences or differential item functioning? *Med Care* 41: III75-VIII186.
- Brazier JE1, Roberts J (2004) The estimation of a preference-based measure of health from the SF-12. *Med Care* 42: 851-859.
- Luo N, Wang P, Fu AZ, Johnson JA, Coons SJ, et al. (2012) Preference-based SF-6D Scores derived from the SF-36 and SF-12 have different discriminative power in a population health survey. *Medical Care* 50: 627-632.
- Lim LL, Fisher JD (1999) Use of the 12-item short-form (SF-12) Health Survey in an Australian heart and stroke population. *Qual Life Res* 8: 1-8.
- Larson CO (2002) Use of the SF-12 instrument for measuring the health of homeless persons. *Health Serv Res* 37: 733-750.
- Windsor TD, Rodgers B, Butterworth P, Anstey KJ, Jorm AF (2006) Measuring physical and mental health using the SF-12: implications for community surveys of mental health. *Aust N Z J Psychiatry* 40: 797-803.
- Hung DY, Lubetkin EI, Fahs MC, Shelley DR (2009) Assessing the impact of behavioral risk factors and known-groups validity of the SF-12 in a US Chinese immigrant population. *Med Care* 47: 262-267.
- Luo X, George ML, Kakouras I, Edwards CL, Pietrobon R, et al. (2003) Reliability, validity, and responsiveness of the short form 12-item survey (SF-12) in patients with back pain. *Spine (Phila Pa 1976)* 28: 1739-1745.
- Tabolli S, Spagnoli A, diPietro, Pagliarello C, Paradisi A, et al. (2011) Assessment of the health status of 2499 dermatological outpatients using the 12-item medical outcomes study short form (SF-12) questionnaire. *British Journal of Dermatology* 165: 1190-1196.
- Failde I, Medina P, Ramírez C, Arana R (2010) Construct and criterion validity of the SF-12 health questionnaire in patients with acute myocardial infarction and unstable angina. *Journal of Evaluation in Clinical Practice* 16: 569-573.
- Mols F, Pelle AJ, Kupper N (2009) Normative data of the SF-12 health survey with validation using post myocardial infarction patients in the Dutch population. *Quality of life Research* 18: 403-414.
- Johnson JA, Pickard AS (2000) Comparison of the EQ-5D and SF-12 health surveys in a general population survey in Alberta, Canada. *Med Care* 38: 115-121.
- Amir M, Lewin-Epstein N, Becker G, Buskila D (2002) Psychometric properties of the SF-12 (Hebrew version) in a primary care population in Israel. *Med Care* 40: 918-928.
- Franks P, Lubetkin EI, Gold MR, Tancredi DJ (2003) Mapping the SF-12 to preference-based instruments: convergent validity in a low-income, minority population. *Med Care* 41: 1277-1283.
- Ware J Jr, Kosinski M, Keller SD (1996) A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Med Care* 34: 220-233.
- Campo-Arias A1, Oviedo HC (2008) [Psychometric properties of a scale: internal consistency]. *Rev Salud Publica (Bogota)* 10: 831-839.
- Schneeweiss H, Mathes H (1995) Factor Analysis and Principal Components. *Journal of Multivariate Analysis* 55: 105-124.
- Kudielka BM, Hanebuth D, Grande G, Gander ML, Grande G, et al. (2005) Health-related quality of life measured by the SF-12 in working population: associations with psychosocial work characteristics. *Journal of Occupational health Psychology* 10: 429-440.
- Lam CL, Tse EY, Gandek B (2005) Is the standard SF-12 health survey valid and equivalent for a Chinese population? *Qual Life Res* 14: 539-547.
- Hurtado D, García D, Copete A (2013) Las vicisitudes del capital social de Colombia. Los cambios de Ksocial (capital social), Confie (Confianza institucional y control indirecto del estado) y Fenoval (Fe en fuentes de información no validadas) 1997-2005-2011. Fundación Antonio Restrepo Barco. Bogotá, D.C.351-365.
- Reyes AM, Acuña L (2008) Reportes de niños y padres sobre eventos vitales estresantes y síntomas de enfermedad. *Rev Interam Psicol Interam J Psychol* 42: 272-286.
- Ostroot N, Shin D, Snyder W (1982) Quality of life perceptions in two cultures. *Social Indicators Research* 11: 113-138.
- Urzúa A, Miranda-Castillo C, Caqueo-Urizar A, Mascayano F (2013) Do cultural values affect quality of life evaluations?. *Social Indicators Research* 114: 1295-1313.
- Jakobsson U, Westergren A, Lindskov S, Hagell P (2012) Construct validity of the SF-12 in three different samples. *J Eval Clin Pract* 18: 560-566.
- Luciano JV, Bertsch J, Salvador-Carulla L, Tomás, Fernández A, et al. (2010) Factor structure, internal consistency and construct validity of the Sheehan disability scale in a Spanish primary care sample. *Journal of Evaluation in Clinical Practice* 16: 895-901.
- Rodríguez MC, Molina, J, Jimenez C, Pinzón BT (2011) Calidad de vida y actividad física en estudiantes, docentes y administrativos de una universidad de Bogotá. *Cuadernos Hispanoamericanos de Psicología* 11: 19-37.